

10-23-00

A

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

UTILITY PATENT APPLICATION TRANSMITTAL LETTER

Atty./Agent Docket No.: CE08159R

Mailing Date: October 20, 2000

Express Mail Label No.: EK414665457US

JC714 U.S. PTO  
09/693799



Assistant Commissioner for Patents  
Box Patent Application  
Washington, D.C. 20231

Dear Sir:

Transmitted herewith for filing under 37 CFR 1.53 (b) is a Nonprovisional Utility Patent Application:

☒ New Application; or

☐ Continuation; or ☐ Divisional, or ☐ Continuation-in-Part (CIP) Application of prior US application No. \_\_\_\_\_, filed on \_\_\_\_\_, having US Examiner \_\_\_\_\_, in Group Art Unit \_\_\_\_\_: of

Inventor(s): Luz et al.

For (Title): Automatic Gain Control with Digital Filtering for Radio-Frequency Communications System

This transmittal letter has 2 total pages.

Enclosed are:

☒ 3 sheets of drawings, along with 19 pages of specification, claims, and abstract.

☒ Oath or Declaration Combined with Power of Attorney (4 pages)

☒ Newly Executed (original or copy)

☐ Copy from a prior application (if this is a Continuation/Division with no new matter)

☐ Statement deleting named inventor(s) in prior application if this is a Continuation/Division (See 37 CFR 1.63(d)(2) and 1.33(b).)

☐ Consider as the above Statement, Please delete as inventors for this application the following inventors named in the prior application: \_\_\_\_\_

☐ Foreign priority to \_\_\_\_\_ Patent application having serial number \_\_\_\_\_, and a filing date of \_\_\_\_\_ is hereby claimed under 35 USC 119.

☐ A copy of the priority document is included herewith.

☒ An Assignment Transmittal Letter and Assignment of the invention to MOTOROLA, INC.

☐ An Information Disclosure Statement (IDS), with \_\_\_\_\_ PTO-1449, and \_\_\_\_\_ citation copies.

☐ Petition For Extension of Time for parent application of the present Continuation/Division/CIP application

☒ Print EFS Inventor Information Sheet(s).

☒ Return Receipt Postcard

☐ Preliminary Amendment

☐ Please cancel filed claims \_\_\_\_\_.

☐ Incorporation by Reference (for Continuation/Division application) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

☐ Since the present application is based on a prior US application, please amend the specification by adding the following sentence before the first sentence of the specification: "The present application is based on prior US application No. \_\_\_\_\_, filed on \_\_\_\_\_, which is hereby incorporated by reference, and priority thereto for common subject matter is hereby claimed."

☒ The filing fee is calculated as follows:

CLAIMS AS FILED, LESS ANY CANCELED BY AMENDMENT

	NUMBER OF CLAIMS	NUMBER EXTRA	RATE	FEE
TOTAL CLAIMS	17 - 20 =	0	X \$18	= \$ .00
INDEPENDENT CLAIMS	3 - 3 =	0	X \$80	= \$ .00
MULTIPLE DEPENDENT CLAIMS			\$270	= \$ 0.00
BASIC FEE				=\$ 710.00
TOTAL FILING FEE				=\$ 710.00

☒ Please charge Deposit Account No. 13-4772 in the amount of \$ 710.00 for the Total Filing Fee.

☒ The Commissioner is hereby authorized to charge any additional fees which may be required now or in the future under 37 CFR 1.16 or 37 CFR 1.17, including any present or future time extension fees which may be required, or credit any overpayment to Deposit Account No. 13-4772

☒ One additional copy of this sheet is enclosed

Please forward all correspondence to:

Customer Number **22917**

By: 

Kenneth A. Haas  
Attorneyfor Applicant(s)  
Registration No. 42,614  
MOTOROLA, INC.  
Phone: (847) 576-0379  
Fax: (847) 576-3750

# INVENTOR INFORMATION

Inventor One Given Name:: Yuda Y  
Family Name:: Luz  
Postal Address Line One:: 2211 Avalon Drive  
City:: Buffalo Grove  
State or Province:: IL  
Country:: USA  
Postal or Zip Code:: 60089  
City of Residence:: Buffalo Grove  
State or Province of Residence:: IL  
Country of Residence:: USA  
Citizenship Country:: Israel  
Inventor Two Given Name:: Ron  
Family Name:: Rotstein  
Postal Address Line One:: 412 Gregg Lane  
City:: Buffalo Grove  
State or Province:: IL  
Country:: USA  
Postal or Zip Code:: 60089  
City of Residence:: Buffalo Grove  
State or Province of Residence:: IL  
Country of Residence:: USA  
Citizenship Country:: Israel  
Inventor Three Given Name:: Gregory  
Family Name:: Agami  
Postal Address Line One:: 520 S. Rammer Avenue  
City:: Arlington Heights  
State or Province:: IL  
Country:: USA  
Postal or Zip Code:: 60004  
City of Residence:: Arlington Heights  
State or Province of Residence:: IL  
Country of Residence:: USA  
Citizenship Country:: USA

## CORRESPONDENCE INFORMATION

Correspondence Customer Number:: 22917  
Fax One:: (847) 576-3750

## APPLICATION INFORMATION

Title Line One:: Automatic Gain Control with Digital Filt  
Title Line Two:: ering for Radio-Frequency Communications  
Title Line Three:: System  
Total Drawing Sheets:: 3  
Formal Drawings?: Yes  
Application Type:: Utility

Docket Number:: CE08159R  
Secrecy Order in Parent Appl.?:: No

REPRESENTATIVE INFORMATION

Representative Customer Number:: 22917

Source:: PrintEFS Version 1.0.1

000207" 6648960

Figure 1 consists of 12 bar charts (a-l) showing the percentage of total protein in various cellular fractions (cytosol, mitochondria, microsomes, and total) for different cell lines and treatments. The charts are arranged in a 6x2 grid. Each chart has a y-axis from 0 to 100% and an x-axis with categories: Cytosol, Mitochondria, Microsomes, and Total. Data is shown for Control (white bars) and various treatments (hatched bars). Statistical significance is indicated by asterisks (\*, \*\*, \*\*\*).

Chart	Cell Line	Treatment	Cytosol (%)	Mitochondria (%)	Microsomes (%)	Total (%)
a	MDA-MB-231	Control	~65	~15	~15	100
b	MDA-MB-231	Control	~65	~15	~15	100
c	MDA-MB-231	Control	~65	~15	~15	100
d	MDA-MB-231	Control	~65	~15	~15	100
e	MDA-MB-231	Control	~65	~15	~15	100
f	MDA-MB-231	Control	~65	~15	~15	100
g	MDA-MB-231	Control	~65	~15	~15	100
h	MDA-MB-231	Control	~65	~15	~15	100
i	MDA-MB-231	Control	~65	~15	~15	100
j	MDA-MB-231	Control	~65	~15	~15	100
k	MDA-MB-231	Control	~65	~15	~15	100
l	MDA-MB-231	Control	~65	~15	~15	100

5           Analog filters in the radio frequency,  
intermediate frequency, and baseband ranges are  
typically used to mitigate out-of-band interference.  
Disadvantageously, analog filters can be expensive,  
especially for the higher frequencies.

## 10

15

20

30

25

30

35

FIG. 6 illustrates frequency response comparisons as between an "deal" IF filter and a "practical" IF filter.



5

20

30





converter 106, an intermediate frequency (IF) filter 108B, herein a "practical" IF filter embodiment, an intermediate frequency amplifier 110, a filtered automatic gain control 202, a demodulator 114, an analog-to-digital (A/D) converter 118, a digital receiver 120, and a finite impulse response lowpass filter 122.

The automatic gain control 202 includes a first decimator 204, a digital infinite impulse response filter 206, a second decimator 208, an average power estimator 210, and a gain look-up table 212.

In operation, the radio frequency communications receiver 200 is similar to that of FIG. 1 except as follows. The analog-to-digital converter 118 samples the filtered complex baseband signal to provide an adequate sampling output for the digital finite impulse response filter 122 at a sampling rate of, for example, four times the Nyquist sampling rate. The analog-to-digital converter 118 digitizes the complex baseband signal to a series of complex digital samples, i.e., two separate series of digital samples that are representative of the real (in-phase) and imaginary (quadrature-phase) components of the communications signal respectively. The two series of digital samples output by the analog-to-digital converter 118 are then received as input by the digital finite impulse response lowpass filter 122. The digital finite impulse response lowpass filter 122 further removes out-of-band interference and outputs a digital output signal to the digital receiver 120. The digital finite impulse response lowpass filter 122 and the digital receiver 120 may be implemented in hardware or software according to well known techniques.

The filtered automatic gain control 202 receives as input the two series of digital samples from the analog-to-digital converter 118. Assuming

The second decimator 208 again reduces the sample rate by half to relax the performance requirements of the average power estimator 210. The average power estimator calculates an average power estimate as a running average of the signal power, for example, by calculating a sum of the squares of the two series of digital samples received from the second decimator 208. The average power estimate is generated as output to the lookup table 212.

The lookup table 212 contains amplifier gain coefficients for each average power estimate. The amplifier gain coefficients are precalculated as a function of the average power estimate, for example, the scalar factor between each average power estimate and the desired average output power within the dynamic range of the analog-to-digital converter 118. Each amplifier gain coefficient adjusts the gain of the

intermediate frequency amplifier 110 to minimize the difference between the corresponding average power estimate and the desired average output power within the dynamic range of the analog-to-digital converter 118, thereby maintaining the average power of the amplified intermediate frequency signal at the full usable dynamic range of the analog-to-digital converter 118. Because interference signal power may be higher than the communications signal power, some of the higher order bits of the analog-to-digital converter 118, for example, the two most significant bits, are reserved as headroom to avoid overflow or clipping of the communications signal. Some of the lower order bits of the analog-to-digital converter 118, for example, the two least significant bits, are used for precision in the digital infinite impulse response filter 206. The remaining bits of the analog-to-digital converter 118, for example, the middle four bits, are extracted by the digital finite impulse response lowpass filter 122 to filter the baseband signal for the digital receiver 120. In this example, an eight-bit analog-to-digital converter may be used for the analog-to-digital converter 118.

FIG. 3 is a block diagram of an infinite impulse response filter 206 for the automatic gain control of FIG. 2 that can provide 20 dB attenuation between 0.8 of the Nyquist rate and 1.0 of the Nyquist rate. Identical infinite impulse response filters 206 may be used for each of the two series of digital samples. While the digital finite impulse response lowpass filter 122 is used for baseband filtering at the digital receiver 120 because of its low phase and magnitude distortion in the filtered digital baseband, the digital infinite impulse response lowpass filter 206 is a preferred choice for the filtered automatic

gain control 202 because it is simple to implement and incurs minimal time delay in the signal. Also, the relatively greater phase distortion of an infinite impulse response (IIR) filter compared to a finite impulse response filter do not adversely affect the calculation of the average power by the average power estimator 210.

By way of example, for code division multiple access (CDMA) applications requiring compliance with the CDMA2000 standard in which each channel has, for example, a bandwidth of 3.6864 MHz, the infinite impulse response filter 206 may be described by the following transfer function:

$$H(z) = \frac{0.3125(1+z^{-1})^2}{(1+0.5jz^{-1})(1-0.5jz^{-1})} \quad (1)$$

The transfer function (1) may be implemented in either hardware or software as shown in FIG. 3 by a first sum function 302, a first sum register 304, a first unit delay 306, a third sum function 308, a second unit delay 310, a first multiplier 312, a second multiplier 314, a second sum function 316, a second sum register 318, a third sum register 320, and a third multiplier 322.

In operation, the output of the first decimator 204 is received as an N-bit wide input and summed by the first sum function 302. The output of the sum function 302 is stored in the first sum register 304. The first sum register 304 is N+1 bits wide, which is one bit wider than the output of the analog-to-digital converter 118, to accommodate the output of the first sum function 302.

The output of the first sum register 304 is delayed one sample period by the first unit delay 306 to generate a first delayed sum.

The first delayed sum output from the first unit delay 306 is multiplied by two by the first multiplier 312 and is delayed one sample period by the second unit delay 310 to generate a second delayed sum. The second delayed sum is multiplied by -0.25 by the second multiplier 314. The output of the second multiplier 314 is summed by the first sum function 302. The second delayed sum and the output of the first multiplier 312 are summed by the second sum function 316.

The output of the second sum function 316 is stored in the second sum register 318. The second sum register 318 is one bit wider than the output of the analog-to-digital converter 118 to accommodate the output of the second sum function 316. The output of the second sum register 318 and the output of the first sum register 304 are summed by the third sum function 308. The output of the third sum function 308 is stored in the third sum register 320. The third sum register 320 is two bits wider than the output of the analog-to-digital converter 118 to accommodate the output of the third sum function 308.

The output of the third sum register 320 is multiplied by 0.3125 by the third multiplier 322 to normalize the output of the third multiplier 322 to the digital sample series received as input by the first sum function 302. The output of the third multiplier 322 has the same number of bits N as the analog-to-digital converter 118 and is the lowpass filtered output of the infinite impulse response lowpass filter 206.



## CLAIMS

What is claimed is:

1. An automatic gain control comprising:
  - 5 a digital lowpass filter for filtering a series of digital samples generated by an analog-to-digital converter to generate a lowpass filtered digital sample series;
  - a power averager coupled to the digital lowpass
  - 10 filter for calculating an average power of the lowpass filtered digital sample series; and
  - a lookup table coupled to the power averager for setting a selectable gain of an amplifier coupled to the analog-to-digital converter as a function of the
  - 15 average power.

2. The automatic gain control of Claim 1 wherein the digital lowpass filter is an infinite impulse response digital lowpass filter.

3. The automatic gain control of Claim 2 wherein the infinite impulse response digital lowpass filter has a transfer function that may be expressed as:

$$H(z) = \frac{\sum_m b_m z^{-m}}{\sum_n a_n z^{-n}}.$$

4. The automatic gain control of Claim 2 wherein the infinite impulse response digital lowpass
- 30 filter comprises:

a first sum function for receiving as input a series of digital samples and for generating a first sum;



```

        a first unit delay coupled to the first sum
        register for delaying the first sum by one sample
5   period to generate a first delayed sum;

```

```

    a first multiplier coupled to the first unit delay
10  for multiplying the first delayed sum by two;

```

```

        a second sum function coupled to the second unit
15  delay and the first multiplier for generating a second
    sum;

```

```

    a third sum function coupled to the first sum
20 register and the second sum register for generating a
    third sum;

```

a third multiplier coupled to the third sum  
25 register for multiplying the third sum by a second  
constant to generate a normalized lowpass filtered  
output.

5. The automatic gain control of Claim 1  
30 wherein the lowpass filter attenuates frequencies  
between half Nyquist rate and Nyquist rate.

6. The automatic gain control of Claim 1  
wherein the lookup table sets the selectable gain of  
35 the amplifier so that the amplified signal has constant

average power within the dynamic range of the analog-to-digital converter.

[illegible]



8. A method for automatic gain control comprising the following steps:

amplifying a communications signal according to a  
5 selectable gain to generate an amplified communications signal;

digitizing the amplified communications signal to generate a series of digital samples representative of the amplified communications signal;

10 lowpass filtering the series of digital samples to generate a lowpass filtered digital sample series;

calculating an average power of the lowpass filtered digital sample series; and

15 setting the selectable gain of the amplifier as a function of the average power.

9. The method of Claim 8 wherein the step of lowpass filtering includes lowpass filtering by an infinite impulse response digital lowpass filter.

20

10. The method of Claim 9 wherein the infinite impulse response digital lowpass filter has a transfer function that may be expressed as:

$$H(z) = \frac{\sum_m b_m z^{-m}}{\sum_n a_n z^{-n}}.$$

25

11. The method of Claim 9 wherein the infinite impulse response digital lowpass filter comprises:

a first sum function for receiving as input a  
30 series of digital samples and for generating a first sum;

a first sum register coupled to the first sum function for storing the first sum;

5       a second unit delay coupled to the first unit  
      delay for delaying the first sum by two sample periods  
      to generate a second delayed sum;

10       a second multiplier coupled to the second unit  
delay for multiplying the second delayed sum by a first  
constant;

15        a second sum register coupled to the second sum  
function for storing the second sum;

20        a third sum register coupled to the third sum  
function for storing the third sum; and

12. The method of Claim 8 wherein the step of lowpass filtering attenuates frequencies between half Nyquist rate and Nyquist rate.

30

13. The method of Claim 8 wherein the step of setting the selectable gain includes setting the gain of the amplifier so that the amplified signal has constant average power within the dynamic range of the

35 series of digital samples.



## ABSTRACT OF THE DISCLOSURE

An automatic gain control includes a digital lowpass filter for filtering a series of digital samples generated by an analog-to-digital converter to generate a lowpass filtered digital sample series; a power averager coupled to the digital lowpass filter for calculating an average power of the lowpass filtered digital sample series; and a lookup table coupled to the power averager for setting a selectable gain of an amplifier coupled to the analog-to-digital converter as a function of the average power.

1990-1991		1991-1992		1992-1993		1993-1994		1994-1995		1995-1996		1996-1997		1997-1998		1998-1999		1999-2000		2000-2001		2001-2002		2002-2003		2003-2004		2004-2005		2005-2006		2006-2007		2007-2008		2008-2009		2009-2010		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2023-2024		2024-2025		2025-2026		2026-2027		2027-2028		2028-2029		2029-2030		2030-2031		2031-2032		2032-2033		2033-2034		2034-2035		2035-2036		2036-2037		2037-2038		2038-2039		2039-2040		2040-2041		2041-2042		2042-2043		2043-2044		2044-2045		2045-2046		2046-2047		2047-2048		2048-2049		2049-2050		2050-2051		2051-2052		2052-2053		2053-2054		2054-2055		2055-2056		2056-2057		2057-2058		2058-2059		2059-2060		2060-2061		2061-2062		2062-2063		2063-2064		2064-2065		2065-2066		2066-2067		2067-2068		2068-2069		2069-2070		2070-2071		2071-2072		2072-2073		2073-2074		2074-2075		2075-2076		2076-2077		2077-2078		2078-2079		2079-2080		2080-2081		2081-2082		2082-2083		2083-2084		2084-2085		2085-2086		2086-2087		2087-2088		2088-2089		2089-2090		2090-2091		2091-2092		2092-2093		2093-2094		2094-2095		2095-2096		2096-2097		2097-2098		2098-2099		2099-2100		2100-2101		2101-2102		2102-2103		2103-2104		2104-2105		2105-2106		2106-2107		2107-2108		2108-2109		2109-2110		2110-2111		2111-2112		2112-2113		2113-2114		2114-2115		2115-2116		2116-2117		2117-2118		2118-2119		2119-2120		2120-2121		2121-2122		2122-2123		2123-2124		2124-2125		2125-2126		2126-2127		2127-2128		2128-2129		2129-2130		2130-2131		2131-2132		2132-2133		2133-2134		2134-2135		2135-2136		2136-2137		2137-2138		2138-2139		2139-2140		2140-2141		2141-2142		2142-2143		2143-2144		2144-2145		2145-2146		2146-2147		2147-2148		2148-2149		2149-2150		2150-2151		2151-2152		2152-2153		2153-2154		2154-2155		2155-2156		2156-2157		2157-2158		2158-2159		2159-2160		2160-2161		2161-2162		2162-2163		2163-2164		2164-2165		2165-2166		2166-2167		2167-2168		2168-2169		2169-2170		2170-2171		2171-2172		2172-2173		2173-2174		2174-2175		2175-2176		2176-2177		2177-2178		2178-2179		2179-2180		2180-2181		2181-2182		2182-2183		2183-2184		2184-2185		2185-2186		2186-2187		2187-2188		2188-2189		2189-2190		2190-2191		2191-2192		2192-2193		2193-2194		2194-2195		2195-2196		2196-2197		2197-2198		2198-2199		2199-2200		2200-2201		2201-2202		2202-2203		2203-2204		2204-2205		2205-2206		2206-2207		2207-2208		2208-2209		2209-2210		2210-2211		2211-2212		2212-2213		2213-2214		2214-2215		2215-2216		2216-2217	
-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--	-----------	--

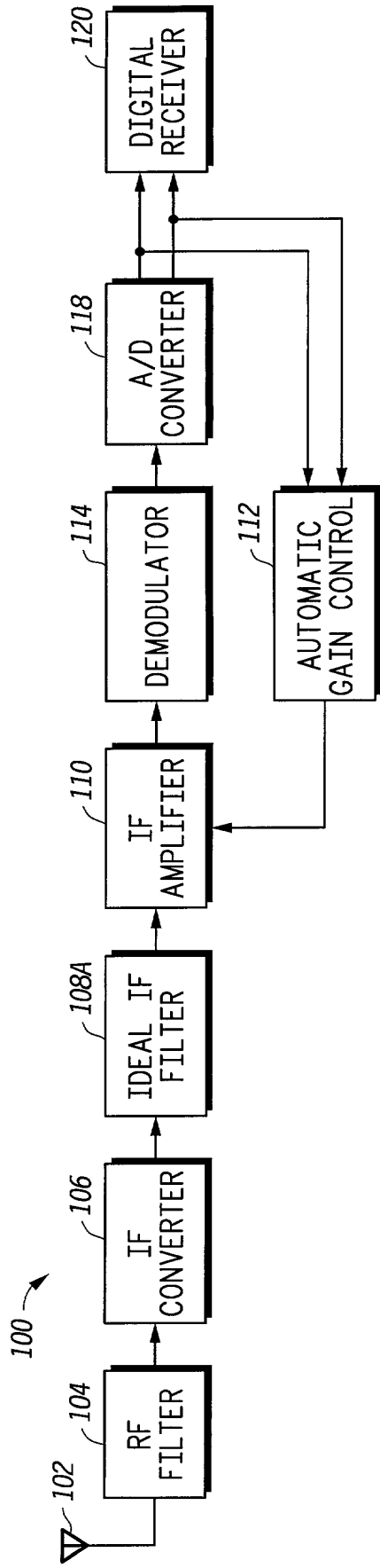


FIG. 1

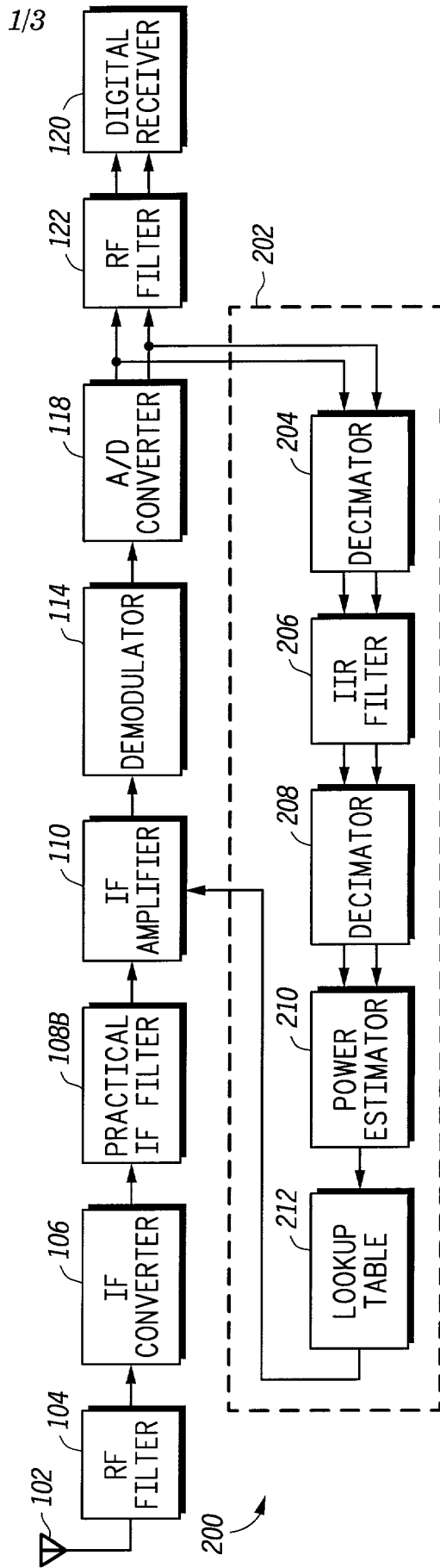


FIG. 2



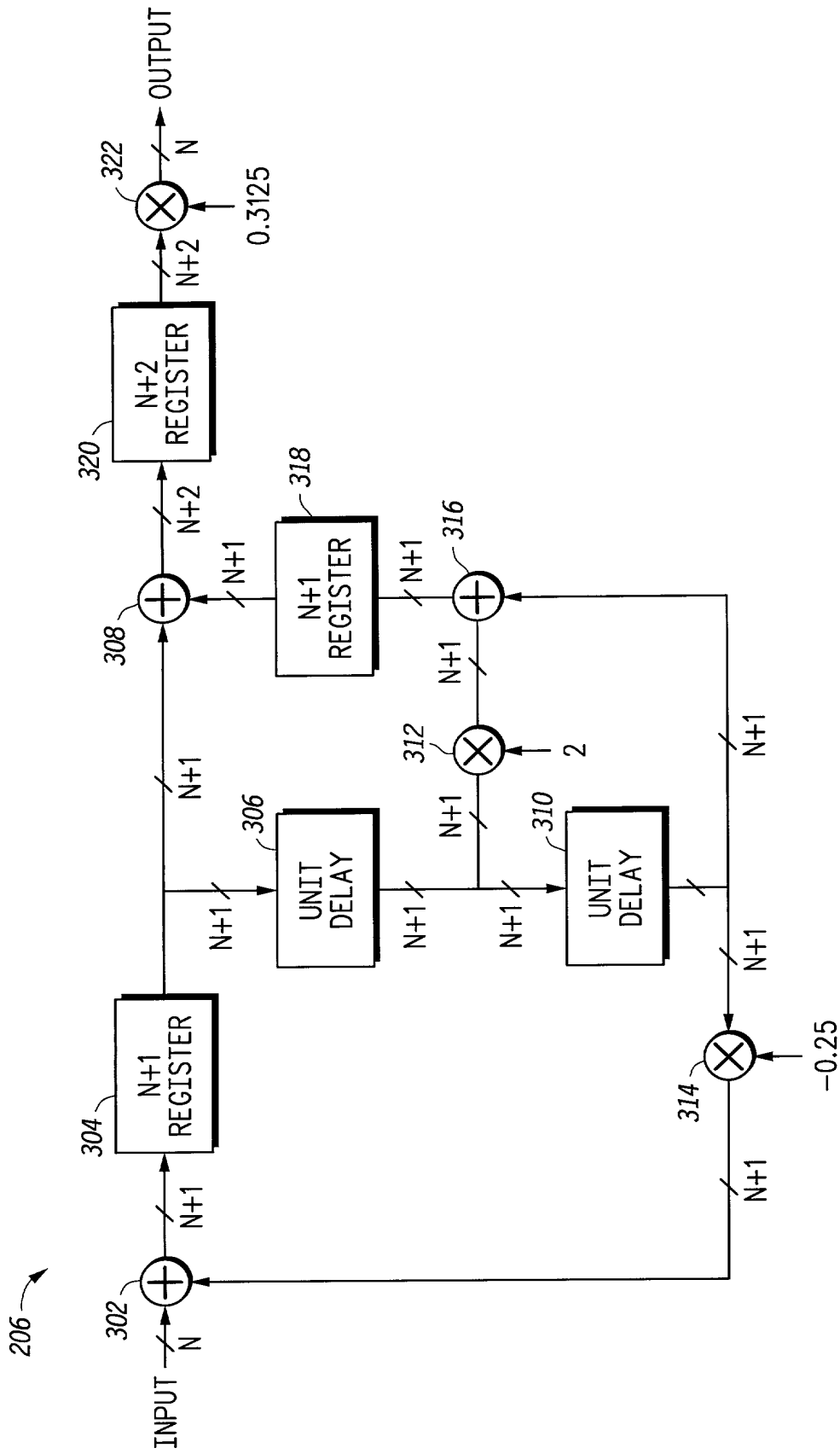
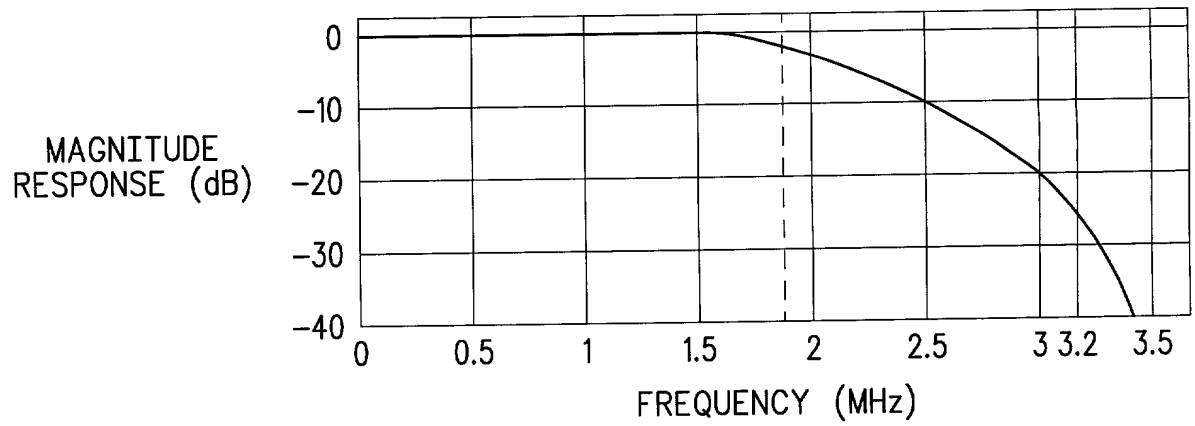
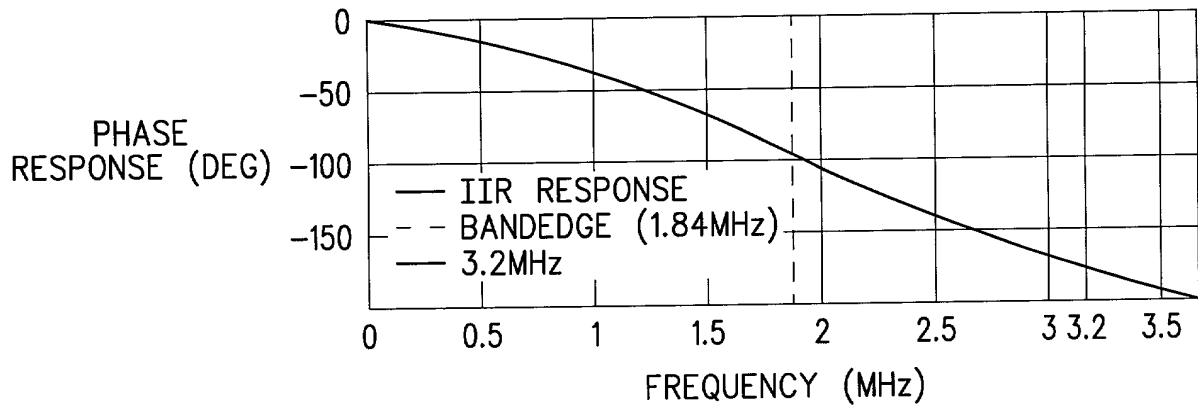
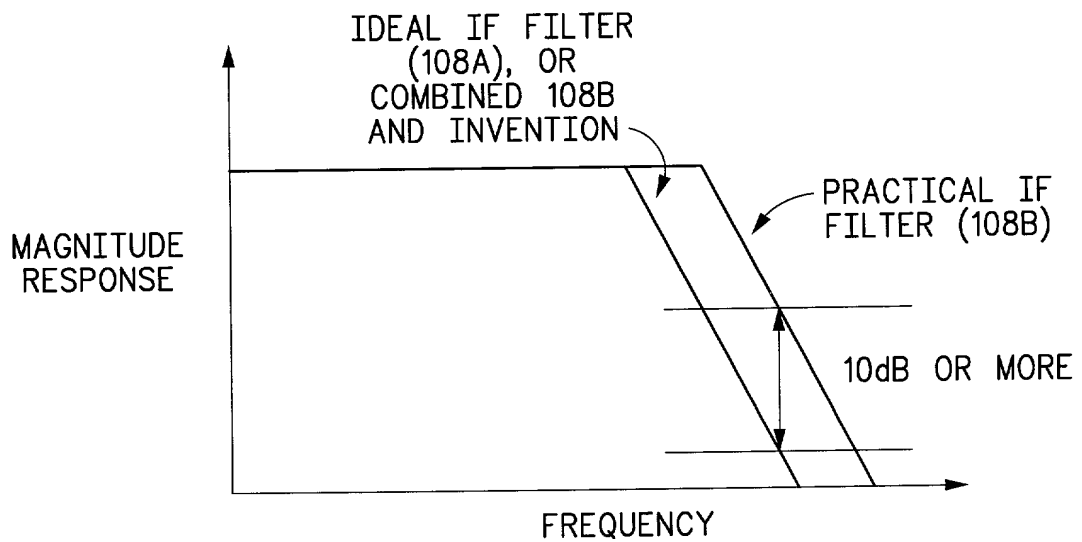


FIG. 3

**FIG. 4****FIG. 5****FIG. 6**

PATENT APPLICATION DECLARATION  
COMBINED WITH POWER OF ATTORNEY

Attorney's Docket No.: CE08159R



Regular (Utility)



Design Application

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

AUTOMATIC GAIN CONTROL WITH DIGITAL FILTERING FOR RADIO-FREQUENCY  
COMMUNICATIONS SYSTEM

the specification of which:



is attached hereto



was filed on: \_\_\_\_\_

as U.S. Serial No.: \_\_\_\_\_

and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with 37 CFR § 1.56(a).

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):



no such application(s) filed



such application(s) identified as  
follows:

Application Number	Country	Date of Filing (day, month, year)	Priority Claimed	
			<input type="checkbox"/> Yes	<input type="checkbox"/> No
			<input type="checkbox"/> Yes	<input type="checkbox"/> No

CE08159R

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below:

Provisional Application Serial No.: \_\_\_\_\_

Provisional Application Filing Date: \_\_\_\_\_

I hereby claim the priority benefit under 35 USC §120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

Prior U.S. Application(s):



no such application(s) filed



such application(s) identified as follows:

U.S. Parent Application No. or PCT Parent No.	Filing Date (day, month, year)	Status (Patented, Pending, Abandoned)

AS A NAMED INVENTOR, I HEREBY APPOINT THE FOLLOWING REGISTERED ATTORNEY(S) OR AGENT(S) TO PROSECUTE THIS APPLICATION AND TO TRANSACT ALL BUSINESS IN THE PATENT AND TRADEMARK OFFICE CONNECTED THEREWITH:

**CUSTOMER NUMBER 22917**

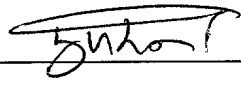
Send correspondence to Customer Number **22917**

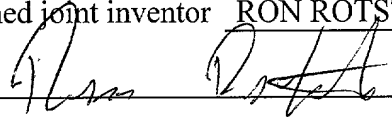
Address all telephone calls to:

Kenneth A. Haas at (847) 576-0379

Fax (847) 576-3750

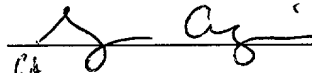
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 USC and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first-named or sole inventor <u>YUDA YEHUDA LUZ</u>		
Inventor's signature <u></u>	Date <u>10/13/00</u>	
Residence <u>Buffalo Grove</u>	IL	
City	State or Foreign Country	
Citizenship <u>Israel</u>	Country	
Post Office Address <u>2211 Avalon Drive</u>		
Street Address		
Buffalo Grove	IL	60089
City	State or Country	Zip Code

Full name of second-named joint inventor <u>RON ROTSTEIN</u>		
Inventor's signature <u></u>	Date <u>10/13/00</u>	
Residence <u>Buffalo Grove</u>	IL	
City	State or Foreign Country	
Citizenship <u>Israel</u>	Country	
Post Office Address <u>412 Gregg Lane</u>		
Street Address		
Buffalo Grove	IL	60089
City	State or Country	Zip Code

Full name of third-named joint inventor GREGORY AGAMI

Inventor's signature



Date

10/19/00

Residence

<sup>GA</sup>  
~~Chicago~~  
City

Arlington Heights

IL

State or Foreign Country

Citizenship

USA

Country

Post Office Address

<sup>GA</sup>  
~~2618 N. Orchard Street #2~~

520 S. Rammer Ave

Street Address

~~Chicago~~

Arlington Heights

IL

City

State or Country

~~60614~~

<sup>GA</sup>  
60004

Zip Code

000001 150416000